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(54) OPTICAL DISK DRIVE DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an optical disk drive device which can check quality of an optical disk by realizing the operation of recording data in an optical disk and the reproduction of the recorded data in real time using one head.

SOLUTION: Digital data of the prescribed quantity stored in a first storage means 13 is read out with speed (n) (integer of 2 or more) times as much as that of writing or more, an optical disk 17 is rotated with speed (n) times as much as that of normal writing or more, and recording is performed. And the optical disk

17 is rotated with speed (n) times as much as that of normal reading or more, digital data of the prescribed quantity recorded in the optical disk 17 is read out, and its error rate or the number of impossibility for correction is discriminated.

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* NOTICES *

CLAIMS

[Claim(s)]

[Claim 1] 1st storage means by which specified quantity writing ** rare ****** of the digital data containing an image component is carried out, A record means to write in the digital data of the specified quantity accumulated in this 1st storage means, to read at the rate beyond n (two or more integers) twice at the time, to make rotate an optical disk at the rate of n times or more at the time of the usual writing, and to record, A reading means to read the digital data of the specified quantity which was made to rotate the optical disk on which the digital data of the specified quantity was recorded by this record means at the rate of n times or more at the time of the usual reading, and was recorded, Optical disk drive equipment characterized by coming to provide a judgment means to judge the error rate or the number of correction impossible of digital data of the specified quantity read in the optical disk at the rate of n times or more usual with this

reading means.

[Claim 2] Optical disk drive equipment according to claim 1 with which the digital data of the specified quantity read with said reading means is characterized by coming to provide the 2nd storage means written in and accumulated at the rate of n usual times or more, and a playback means to read the digital data of the specified quantity accumulated in this 2nd storage means at the rate of usual, and to reproduce.

[Claim 3] Said judgment means is optical disk drive equipment according to claim 1 characterized by generating warning when it is judged that the error rate or the number of correction impossible of digital data of the specified quantity read in said optical disk at the rate of n usual times or more judged whether it would have exceeded substantially the reference value set up beforehand, and has exceeded.

[Claim 4] Optical disk drive equipment according to claim 3 characterized by coming to provide the control means which makes the digital data of the specified quantity accumulated in said 1st storage means by said judgment means using said record means where said error rate or the number of correction impossible is judged to have exceeded the reference value substantially re-record on other fields of said optical disk.

[Claim 5] An operation means to ask for the error rate or the number of

correction impossible in a block unit of digital data of the specified quantity by which said judgment means was read in said optical disk at the rate of n usual times or more, An equalization means to calculate the average over a fixed period of the error rate or the number of correction impossible called for with this operation means, Optical disk drive equipment according to claim 1 characterized by coming to provide a comparison means to compare the average of the error rate or the number of correction impossible called for with this equalization means with the reference value set up beforehand.

[Claim 6] Said judgment means is optical disk drive equipment according to claim 1 characterized by coming to provide a comparison means to compare an operation means to ask for the error rate or the number of correction impossible in a block unit of digital data of the specified quantity read in said optical disk at the rate of n usual times or more, and the error rate or the number of correction impossible called for with this operation means with the reference value set up beforehand.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the optical disk drive equipment which carries out record playback of the digitized image data, the voice data, etc. at an optical disk, especially, is reproduced on real time at the time of data logging to that optical disk, and relates to the thing which enabled it to check the quality of an optical disk.

[0002]

[Description of the Prior Art] As everyone knows, in recent years, not only voice data but image data can be compressed into the same optical disk with a diameter of 12cm as CD for voice (Compact Disk), and it can record now, for example on it. As this kind of an optical disk, CD-ROM (Read Only Memory) etc. has spread over a broad field, for example until it results [from the object for information] in karaoke.

[0003] Moreover, recently, DVD-ROM which recorded CD, the main image data of the amount which is equivalent to the movie for about 2 hours at the optical disk of the diameter of said, eight kinds of voice data, and the subimage data showing 32 kinds of titles etc. is developed. And in current, the MPEG(Moving Picture Image Coding Experts Group) 2 compression method international-standard-ized to image data is used, and DVD specification which

adopted AC3 compression method to voice data is also proposed.

[0004] This DVD specification supports AC3 method and an MPEG method as a speech compression method, and has further the composition of having added the subimage data which come to carry out run length compression of the bit map data as an object for titles, and a rapid traverse and CDC already for special playback of return etc. (navigation pack) while it uses MPEG 2 for an image compression method according to an MPEG 2 system layer.

[0005] Moreover, by this DVD specification, Micro UDF (Universal Disk Format) is supported with ISO (International Organization for Standardization)9660 so that a personal computer can also read data, for example.

[0006] By the way, although this DVD specification is the specification only set to playbacks and it is not taken into consideration about the image record regeneration system for home use, the optical disk which can perform the writing and rewriting of data has also been developed, for example like DVD-RAM (Random Access Memory) now. For this reason, it is greatly expected in the near future that the image record regeneration system for home use which uses a rewritable optical disk as a record medium appears in a commercial scene.

[0007] On the other hand, as an image record regeneration system for home use in the present condition, the analog VTR (Video Tape Recorder) which used the magnetic tape as a record medium occupies the mainstream. By the way, since

he is trying to make one head serve a double purpose by record and playback in order to simplify a configuration and to lower cost, it is [this kind of analog VTR] impossible to reproduce data [finishing / record] from a magnetic tape to coincidence during record actuation.

[0008] That is, in the conventional analog VTR, if a magnetic tape is rewound and it does not reproduce after record actuation is completed, data can distinguish whether it was correctly recorded on the magnetic tape. for this reason -- for example, when degradation had arisen in some magnetic tapes, or when the whole magnetic tape has deteriorated even on the level which is not the optimal as a record medium, a user will notice what a magnetic tape is played and begun and is not recorded correctly, after all record actuation is completed.

[0009]

[Problem(s) to be Solved by the Invention] As mentioned above, with the conventional VTR, if a magnetic tape is not played after all record actuation is completed since the data recorded on the magnetic tape are unreproducible on real time, it cannot distinguish whether it is recorded correctly but has the problem that handling is inconvenient to a user.

[0010] Then, this invention was made in consideration of the above-mentioned situation, realizes record actuation of the data to an optical disk, and playback on

the real time of that record data using one head, and aims at offering the very good optical disk drive equipment which can perform the quality check of an optical disk.

[0011]

[Means for Solving the Problem] 1st storage means by which specified quantity writing ** rare ****** of the digital data with which the optical disk drive equipment concerning this invention contains an image component is carried out, A record means to write in the digital data of the specified quantity accumulated in this 1st storage means, to read at the rate beyond n (two or more integers) twice at the time, to make rotate an optical disk at the rate of n times or more at the time of the usual writing, and to record, A reading means to read the digital data of the specified quantity which was made to rotate the optical disk on which the digital data of the specified quantity was recorded by this record means at the rate of n times or more at the time of the usual reading, and was recorded, It has a judgment means to judge the error rate or the number of correction impossible of digital data of the specified quantity read in the optical disk at the rate of n times or more usual with this reading means.

[0012] The digital data which should be recorded is accumulated in the 1st storage means, and data are read in this 1st storage means at the usual rate beyond n (two or more integers) twice, and it records on an optical disk, and he

reads that recorded digital data in an optical disk at the rate of n usual times or more, and is trying to judge an error rate or the number of correction impossible according to the above configurations.

[0013] Namely, since it makes it possible to realize record actuation of the digital data to an optical disk, and playback on the real time of the record data using one optical head, and to perform the quality check of an optical disk Like before, after all record actuation is completed, a magnetic tape is played and begun, un-arranging [of noticing what is not recorded correctly] is lost, and the handling for a user can be made convenient.

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained to a detail with reference to a drawing. In drawing 1 , a sign 11 is an input terminal and the digitized image data are supplied. The image data supplied to this input terminal 11 are supplied to the buffer circuit 13 for record which constitutes the drive block 12 of optical disk drive equipment.

[0015] In this buffer circuit 13 for record, while carrying out constant-rate are recording of the inputted image data based on control of the buffer controller 14, this stored image data is read at the twice [at the time of are recording / more than] as many rate as this. And the image data read from this buffer circuit 13 for record are recorded on an optical disk 17 through the optical head 16, after a

modulation circuit 15 is supplied and addition and predetermined modulation processing of an ECC (Error Correction Code) sign are performed.

[0016] At this time, the optical disk 17 is controlled for record linear velocity to double [more than] so that a rotation drive is usually carried out at a twice [at the time of record / more than] as many rate as this that is,. Moreover, as for the optical head 16, the write-in actuation and read-out actuation of image data to an optical disk 17 are controlled by the optical head driver 18.

[0017] As mentioned above, if it usually finishes recording the digital data of the constant rate accumulated in the buffer circuit 13 for record on an optical disk 16 at a twice [at the time of record / more than] as many rate as this, the optical head 16 will be returned to a recording start location. And the rotation drive of the optical disk 17 is carried out at the same twice [usual / more than] as many rate as the time of record as this, and the record data of an optical disk 17 are read by the optical head 16.

[0018] The data usually read with this optical head 16 at the twice [at the time of playback / more than] as many rate as this are supplied to the buffer circuit 20 for playback, after a demodulator circuit 19 is supplied and recovery processing and ECC data processing are performed. In this buffer circuit 20 for playback, while storing the inputted data at a twice [usual / more than] as many rate as this based on control of the above-mentioned buffer controller 14, it has read at

the rate (the usual rate) which set this stored data by the rate of data processing by the latter decoding circuit 21.

[0019] And the data outputted from this buffer circuit 20 for playback are changed into the analog video signal of for example, an NTSC (National Television System Committee) method by the decoding circuit 21 and the D/A (Digital/Analogue) conversion circuit 22, and are taken out from an output terminal 23.

[0020] In addition, the above-mentioned drive block 12 is controlled by the system controller 24 in generalization. Moreover, this system controller 24 receives a demand of a user through a user interface 25.

[0021] Here, the error rate judging circuit for judging the error rate of the data read in the optical disk 17, and judging degradation of an optical disk 17 is established in the above-mentioned demodulator circuit 19. Drawing 2 shows the detail of this error rate judging circuit. That is, the data read with the optical head 16 are supplied to ECC arithmetic circuit 19b through input terminal 19a, and ECC data processing for error detection is performed.

[0022] And the result of an operation of this ECC arithmetic circuit 19b is supplied to block error rate arithmetic circuit 19c, and the error rate in a predetermined block unit is called for. The error rate in the block unit searched for by this block error rate arithmetic circuit 19c is supplied to 19d of error rate

equalization circuits, and in order are wide range and to check the generating situation of an error, equalization of the error rate over a fixed period is performed.

[0023] Then, the average value of the error rate obtained in 19d of this error rate equalization circuit is compared with the reference value of the error rate for the degradation judging of an optical disk 17 currently held beforehand at reference-value holding circuit 19e at 19f of comparator circuits, and that comparison result is outputted to the above-mentioned system controller 24 through 19g of output terminals.

[0024] In this system controller 24, when the comparison result that the average of the error rate obtained in 19d of error rate equalization circuits exceeds substantially the reference value of the error rate currently held at reference-value holding circuit 19e is obtained, it judges that the optical disk 17 crossed broadly and has deteriorated, and warns a user of that through a user interface 25.

[0025] In addition, the 19f of the above-mentioned comparator circuits compares the reference value of the error rate in the block unit searched for by the above-mentioned block error rate arithmetic circuit 19c, and the error rate for a degradation judging in the block unit currently held beforehand at the above-mentioned reference-value holding circuit 19e, and they are outputting

the comparison result to the above-mentioned system controller 24.

[0026] For this reason, in a system controller 24, when the comparison result that the error rate obtained by block error rate arithmetic circuit 19c exceeds substantially the reference value of the error rate currently held at reference-value holding circuit 19e is obtained, it is judged that the field of the optical disk 17 corresponding to that block has deteriorated.

[0027] In this case, a system controller 24 reads that block data from the record buffer circuit 13, it is again written in other locations of an optical disk 17 at high speed, and it reads it from an optical disk 17 at high speed once again, and judges an error rate. And when it is judged that an error rate exceeds a reference value again, it warns a user of that.

[0028] Drawing 3 and drawing 4 are drawings in which the record playback actuation to the above-mentioned optical disk 17 was summarized for convenience. First, suppose that the record data which have a data length as shown in drawing 3 (a) were stored in the buffer circuit 13 for record. Then, as shown in drawing 3 (b), this record data is read from the buffer circuit 13 for record at a twice [usual / more than] as many rate as this, and is recorded on an optical disk 17 at a twice [usual / more than] as many rate as this.

[0029] After record actuation at this high speed is completed, the optical head 16 is returned to a recording start location, and as shown in drawing 3 (c), data are

reproduced from an optical disk 17 at a twice [usual / more than] as many rate as this. And when the judgment of an error rate is performed to this data by which high-speed playback was carried out and it is judged that it is as low without an error as an error rate does not produce a problem in ****, that data becomes [being recorded on an optical disk 17 with as, and].

[0030] Moreover, at the time of playback of an optical disk 17, the data reproduced from the optical disk 17 at the twice [usual / more than] as many rate as this are stored in the buffer circuit 20 for playback at a twice [usual / more than] as many rate as this, and as shown in drawing 3 (d), they are read at the rate of usual.

[0031] Suppose that the record data which, on the other hand, have a data length as shown in drawing 4 (a) were stored in the buffer circuit 13 for record. Then, as shown in drawing 4 (b), this record data is read from the buffer circuit 13 for record at the rate of 4 usual times or more, and is recorded on an optical disk 17 at the rate of 4 usual times or more.

[0032] After record actuation at this high speed is completed, the optical head 16 is returned to a recording start location, and as shown in drawing 4 (c), data are reproduced from an optical disk 17 at the rate of 4 usual times or more. And the judgment of a block error rate is performed to this data by which high-speed playback was carried out, and when an error rate is judged to exceed a

reference value, as shown in drawing 4 (b), that data is again read in the buffer circuit 13 for record at the rate of 4 usual times or more, and it records on other fields of an optical disk 17 again at the rate of 4 usual times or more.

[0033] And after record actuation for the second time at this high speed is completed, the optical head 16 is returned to a recording start location, and as shown in drawing 4 (c), data are reproduced from an optical disk 17 at the rate of 4 usual times or more. Then, when the judgment of a block error rate is performed to this data by which high-speed playback was carried out and an error rate is judged to be lower than a reference value, that data becomes [being recorded on an optical disk 17 with as, and].

[0034] Moreover, at the time of playback of an optical disk 17, the data reproduced from the optical disk 17 at the rate of 4 usual times or more are stored in the buffer circuit 20 for playback at the rate of 4 usual times or more, and as shown in drawing 4 (d), they are read at the rate of usual. However, the judgment of a block error rate is performed to the 2nd data by which high-speed playback was carried out, and when an error rate is judged to exceed a reference value, it is warned of that to a user.

[0035] According to the above-mentioned gestalt of operation, the data which should be recorded are stored in the buffer circuit 13 for record. Read data in this buffer circuit 13 for record at the usual rate beyond n (two or more integers) twice,

and it records on an optical disk 17. The data is read in an optical disk 17 at the rate of n usual times or more, and an error rate is judged, and when an error rate is high, he is trying to re-record the same data on other fields of an optical disk 17.

[0036] Namely, since it makes it possible to realize record actuation of the data to an optical disk 17, and playback on the real time of the record data using one optical head 16, and to perform the quality check of an optical disk 17 Like before, after all record actuation is completed, a magnetic tape is played and begun, un-arranging [of noticing what is not recorded correctly] is lost, and the handling for a user can be made convenient. Moreover, you may make it judge the quality of an optical disk 17 for example, not only from an error rate but from the number of error correction impossible. In addition, this invention is not limited to the above-mentioned gestalt of operation, in the range which does not deviate from that summary this outside, can deform variously and can be carried out.

[0037]

[Effect of the Invention] As explained in full detail above, according to this invention, record actuation of the data to an optical disk and playback on the real time of that record data can be realized using one head, and the very good optical disk drive equipment which can perform the quality check of an optical disk can be offered.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block block diagram showing the gestalt of implementation of this invention.

[Drawing 2] The block block diagram showing the detail of the error rate judging circuit in the gestalt of this operation.

[Drawing 3] Drawing shown in order to explain record playback actuation of the data in the gestalt of this operation.

[Drawing 4] Drawing shown in order to explain record playback actuation of the data in the gestalt of this operation.

[Description of Notations]

11 -- Input terminal,

12 -- Drive block,

13 -- Buffer circuit for record,

14 -- Buffer controller,

15 -- Modulation circuit,

16 -- Optical head,

17 -- Optical disk

18 -- Optical head driver,

19 -- Demodulator circuit,

20 -- Buffer circuit for playback,

21 -- Decoding circuit,

22 -- D/A conversion circuit,

23 -- Output terminal,

24 -- System controller,

25 -- User interface.